

6.4 Slope-Intercept Form of the Equation for a Linear Function

LESSON FOCUS

Relate the graph of a linear function to its equation in slope-intercept form.

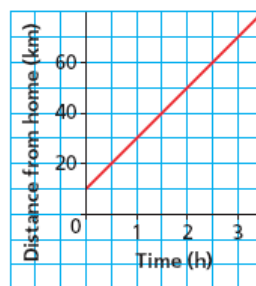
Make Connections

This graph shows a cyclist's journey where the distance is measured from her home.

What does the vertical intercept represent?

What does the slope of the line represent?

Graph of a Bicycle Journey



THINK ABOUT IT

Work with a partner.

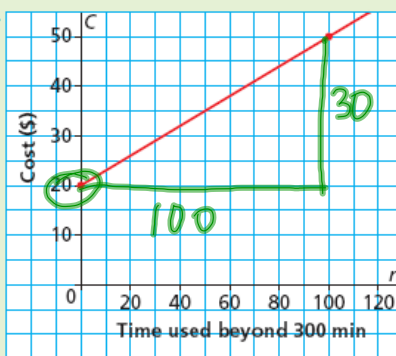
A cell phone plan charges a monthly fee that covers the costs of the first 300 min of phone use. This graph represents the cost of the plan based on the time beyond 300 min.

How do you know this is the graph of a linear function? ✓
What does the slope of the graph represent?

Write an equation to describe this function.

Verify that your equation is correct.

Cost of Cell Phone Plan



$$C = 0.3n + 20$$

Handwritten annotations: "slope" points to 0.3, "y-int." points to 20.

Handwritten calculations:

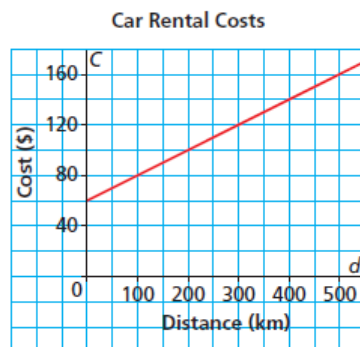
$$\frac{\text{rise}}{\text{run}} = \frac{\$30}{100 \text{ min}} = \$0.3/\text{min}$$

6.4 Slope-Intercept Form of the Equation for a Linear Function

$$y = 0.3x + 20$$

Handwritten annotations: "slope" points to 0.3, "y-int." points to 20.

In Chapter 5, Lesson 5.6, we described a linear function in different ways.
The linear function below represents the cost of a car rental.



An equation of the function is:

$$C = 0.20d + 60$$

The number 0.20 is ?

The number 60 is ?

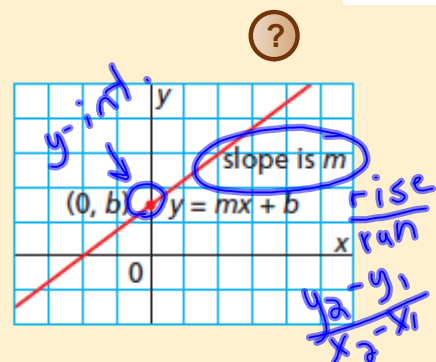
6.4 Slope-Intercept Form of the Equation for a Linear Function

In general, any linear function can be described in slope-intercept form.

copy

Slope-Intercept Form of the Equation of a Linear Function

The equation of a linear function can be written in the form $y = mx + b$, where m is the slope of the line and b is its y-intercept.



6.4 Slope-Intercept Form of the Equation for a Linear Function

Example 1**Writing an Equation of a Linear Function
Given Its Slope and y-Intercept**

The graph of a linear function has slope $\frac{3}{5}$ and y-intercept -4 .
Write an equation for this function.

 **SOLUTION**

$$y = \frac{3}{5}x - 4$$

$$y = mx + b$$

slope y-int



6.4 Slope-Intercept Form of the Equation for a Linear Function

Practice:

1. The graph of a linear function has slope $-\frac{7}{3}$ and y-intercept 5.
Write an equation for this function.



$$y = mx + b$$

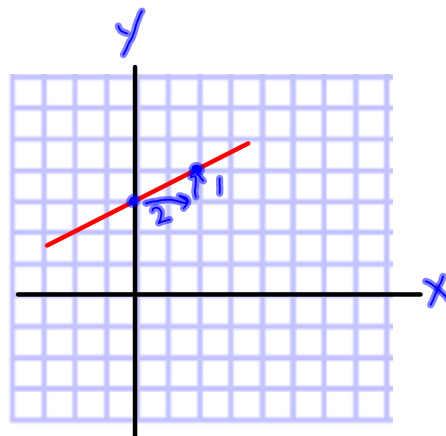
$y = -\frac{7}{3}x + 5$

Example 2**Graphing a Linear Function Given Its Equation in Slope-Intercept Form**

Graph the linear function with equation $y = \frac{1}{2}x + 3$

$$m = \frac{1}{2} = \frac{\text{rise}}{\text{run}}$$

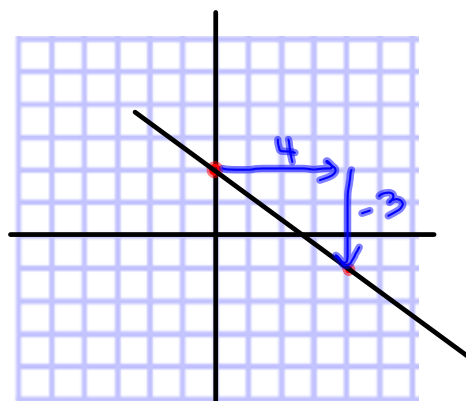
✓ **SOLUTION**



6.4 Slope-Intercept Form of the Equation for a Linear Function

Practice

2. Graph the linear function with equation: $y = -\frac{3}{4}x + 2$



Example 3**Writing the Equation of a Linear Function
Given Its Graph**

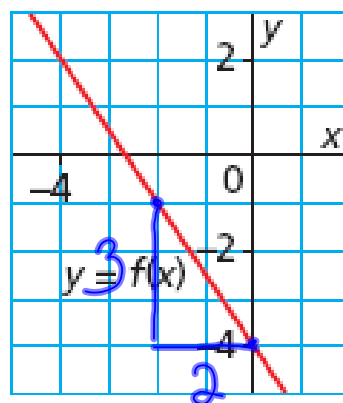
Write an equation to describe this function.
Verify the equation.

✓ **SOLUTION**

$$y = \textcircled{m}x + b$$

↑ ↑

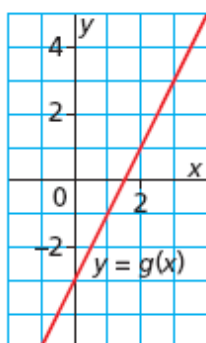
$$y = -\frac{3}{2}x - 4$$



6.4 Slope-Intercept Form of the Equation for a Linear Function

Practice

3. Write an equation to describe this function. Verify the equation.



Classwork/Homework

Page 362 #4, 5, 6, 7ab, 12ab

Thursday, Dec.15

- Warm-up #
- Check and go over homework Pg.362#4,5,6,7ab,12ab
- Do example #4 and practice question
- Classwork/Homework

Reminder: 6.1 & 6.2 Worksheet due Friday
Chapter 6 Test on Wednesday, Dec.21

Extra Help Available at lunch hour!

Warm-up # 10

1. How do you determine whether two lines are parallel?
2. How do you determine whether two lines are perpendicular?
3. What is the slope of a line that is parallel to each of the following:
a. -4 b. $\frac{1}{3}$
4. What is the slope of a line that is perpendicular to each of the following:
a. $\frac{2}{3}$ c. -7
5. Tell me whether the following lines are parallel, perpendicular, or neither:
a. 4, $\frac{1}{4}$ b. $\frac{7}{8}$, $-\frac{8}{7}$ c. 5, 5 d. 3, -3

6.2 Slopes of Parallel and Perpendicular Lines

Warm-up

1. How do you determine whether two lines are parallel?
1 The slopes will be equal.
2. How do you determine whether two lines are perpendicular?
1 negative reciprocal
3. What is the slope of a line that is parallel to each of the following:
2 a. -4 -4 b. $\frac{1}{3}$ $\frac{1}{3}$
4. What is the slope of a line that is perpendicular to each of the following:
2 a. $\frac{2}{3}$ $-\frac{3}{2}$ c. -7 $+\frac{1}{7}$
5. Tell me whether the following lines are parallel, perpendicular, or neither:
a. 4, $\frac{1}{4}$ b. $\frac{7}{8}$, $-\frac{8}{7}$ c. 5, 5 d. 3, -3
N Per Par N

10

Warm-up

1. How do you determine whether two lines are parallel?

They have the same slope

T

10



2. How do you determine whether two lines are perpendicular?

Their slopes are the negative recipricol

T



3. What is the slope of a line that is parallel to each of the following:

a. -4

-4

b. $1/3$

$1/3$

E

4. What is the slope of a line that is perpendicular to each of the following:

a. $2/3$

$-3/2$

c. -7

$1/7$

2

5. Tell me whether the following lines are parallel, perpendicular, or neither:

a. 4, $1/4$

N

b. $7/8$, $-8/7$

Per

c. 5, 5

Par

d. 3, -3

N

4

Please take out yesterday's Classwork/Homework

Page 362 #4, 5, 6, 7ab, 12ab

4. For each equation, identify the slope and y-intercept of its graph.

a) $y = 4x - 7$

b) $y = x + 12$

c) $y = -\frac{4}{9}x + 7$

d) $y = 11x - \frac{3}{8}$

e) $y = \frac{1}{5}x$

f) $y = 3$

	slope	y-int
a)	4	-7
b)	1	12
c)	$-\frac{4}{9}$	7
d)	11	$-\frac{3}{8}$
e)	$\frac{1}{5}$	0
f)	0	3

$y = mx + b$

↑ slope ↑ y-int.

6.4 Slope-Intercept Form of the Equation for a Linear Function

5. Write an equation for the graph of a linear function that:

a) has slope 7 and y-intercept 16

$y = 7x + 16$

b) has slope $-\frac{3}{8}$ and y-intercept 5

$y = -\frac{3}{8}x + 5$

c) passes through $H(0, -3)$ and has slope $\frac{7}{16}$

$y = \frac{7}{16}x - 3$

d) has y-intercept -8 and slope $-\frac{6}{5}$

$y = -\frac{6}{5}x - 8$

e) passes through the origin and has slope $-\frac{5}{12}$

$y = -\frac{5}{12}x$

$y = mx + b$

↑ slope ↑ y-int

6.4 Slope-Intercept Form of the Equation for a Linear Function

6. Graph the line with each y -intercept and slope.

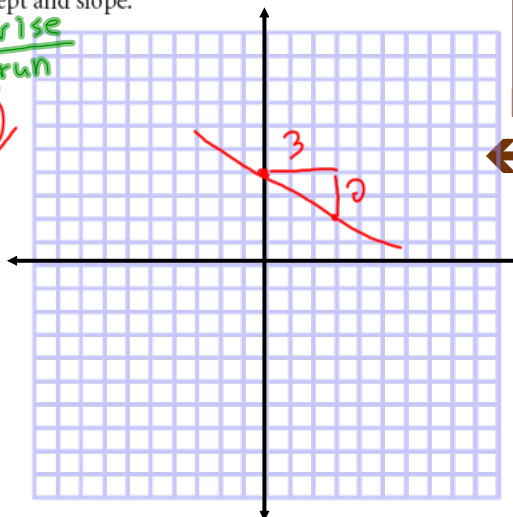
a) y -intercept is 1, slope is $\frac{1}{2}$ *rise run*

b) y -intercept is -5, slope is 2

c) y -intercept is 4, slope is $-\frac{2}{3}$

d) y -intercept is 0, slope is $\frac{4}{3}$

$\frac{2}{1}$



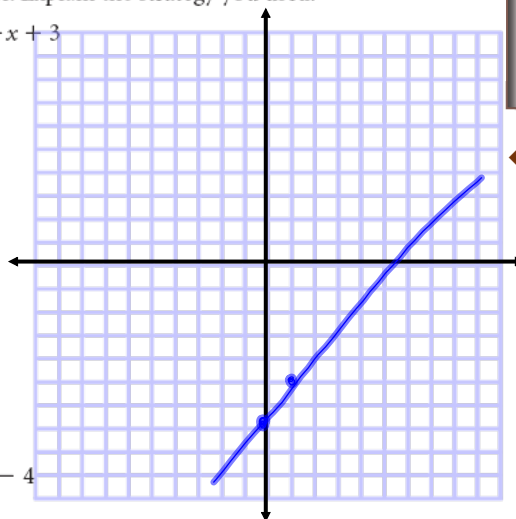
6.4 Slope-Intercept Form of the Equation for a Linear Function

7. Graph each equation on grid paper. Explain the strategy you used.

a) $y = 2x - 7$

b) $y = -x + 3$

slope $\frac{2}{1}$ y -int



c) $y = -\frac{1}{4}x + 5$

d) $y = \frac{5}{2}x - 4$

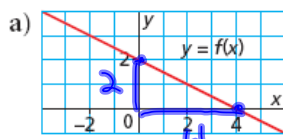
e) $V = -100t + 6000$

f) $C = 10n + 95$

6.4 Slope-Intercept Form of the Equation for a Linear Function

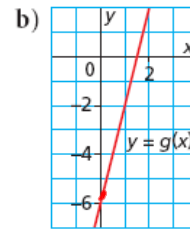
12. For each graph that follows:

- Determine its slope and y -intercept.
- Write an equation to describe the graph, then verify the equation.
- Use the equation to calculate the value of y when $x = 10$.



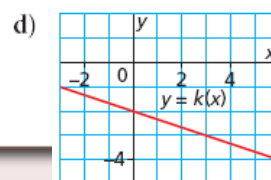
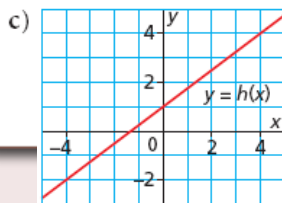
$-\frac{2}{4} = -\frac{1}{2}$ slope
 $y\text{-int} = 2$

$y = mx + b$
 $y = -\frac{1}{2}x + 2$



$\frac{4}{1} = 4$ slope (m)
 $y\text{-int} = -6$

$y = 4x - 6$



cept Form of the Equation for a Linear Function

slope is 10 (m)
 $y\text{-int}$ is -5 (b)

$y = mx + b$
 $\uparrow \quad \uparrow$
 slope $y\text{-int}$

$y = 10x - 5$

Example 4**Using an Equation of a Linear Function to Solve a Problem**

$$y = mx + b$$

The student council sponsored a dance. A ticket cost \$5 and the cost for the DJ was \$300.

- a) Write an equation for the profit, P dollars, on the sale of t tickets.

$$P = 5t - 300$$

- b) Suppose 123 people bought tickets. What was the profit?

$$P = 5(123) - 300$$

$$P = 615 - 300$$

$$P = \$315$$

- c) Suppose the profit was \$350. How many people bought tickets?

$$350 = 5t - 300$$

$$+ 300 \quad + 300$$

$$650 = 5t \quad + = 130$$

$$\frac{650}{5} = \frac{5t}{5}$$

- d) Could the profit be exactly \$146? Justify the answer.

6.4 Slope-Intercept Form of the Equation for a Linear Function

**SOLUTION**

$$146 = 5t - 300$$

Practice:

To join the local gym, Karim pays a start-up fee of \$99, plus a monthly fee of \$29.

- a) Write an equation for the total cost, C dollars, for n months at the gym.
- b) Suppose Karim went to the gym for 23 months. What was the total cost?
- c) Suppose the total cost was \$505. For how many months did Karim use the gym?
- d) Could the total cost be exactly \$600? Justify your answer.



Classwork/Homework

Page 363 #8,11,13,17

